Workshop on Molecular Methods for Water Quality Monitoring

Wyndam Hotel
Wednesday, May 7, 2003
Philadelphia, PA

Water quality of the Nation's lakes, rivers and streams has been monitored since the passage of the Clean Water Act in 1972. Although these waters have been monitored for 30 years, many do not meet the Act's goal of "fishable and swimable". While waterways can be impaired in numerous ways, the protection from pathogenic microbe contamination is most important for waters used for human recreation and aquaculture. Typically, monitoring methods used for detecting potential pathogenic microorganisms in environmental waters are based upon cultivation and enumeration of fecal indicator bacteria (i.e. fecal coliforms, *E. coli*, and fecal enterococci). Currently, there is increasing interest regarding the potential for molecular fingerprinting methods to be used not only for detection, but also for identification of fecal contamination sources. Molecular methods have been applied to study the microbial ecology of environmental systems for years and are now being applied to help improve our waters by identifying problem sources, and determining the effect of implemented risk management solutions (e.g., TMDLs, beach closures). Management and remediation of water pollution would be more cost-effective if the correct sources could be identified. The workshop provided an overview of the primary methods that either have been used or have been suggested for use in microbial source tracking and some of the limitations associated with those methods.

Molecular methods are also being used to address another emerging concern in aquatic ecosystems, the introduction of endocrine disrupting compounds. These compounds may enter aquatic systems from a variety of sources, e.g., pesticide runoff from agriculture, pharmaceuticals used in animal operations, human pharmaceuticals passing through sewage treatment facilities, and various industrial sources. New technologies, focusing on induced genetic changes in aquatic organisms may provide the important link between immediate environmental exposure and long term biological, community and population effects. These methods were described and the potential use of these methods in regional and state water quality programs (e.g, ambient water quality monitoring) was presented.

Agenda

9:00	Welcome - Jon Capacasa, Acting Director, Water Management Division, EPA Region III
9:05 - 9:20	Future Applications of Molecular Methods in Water Monitoring – Lisa Almodovar - EPA Office of Water

9:20 -10:00 Introduction to Molecular Biology - Dave Lattier

- Overview of the cell
- Prokaryotes vs. Eukaryotes
-Genome and Chromosomes
-DNA & RNA Structure and Gene Expression

10:00 -11:00 Microbial Source Tracking - Jorge Santodomingo

- Non- molecular methods, e.g., Antibiotic Sensitivity
- Molecular Methods - Ribotyping, PCR, and Pulsed-field gel electrophoresis

11:00-12:00 Endocrine Disruption Methods in Fish - Dave Lattier

- Development of environmental exposure indicators in aquatic ecosystems
- Endocrine disruption in fresh water fish as a conceptual model
- Molecular biology -or- practicing biochemistry without a license: tools in the box?

Case Study on Endocrine Disruption in Fish Associated with Sewage Treatment Plants in the Mid-Atlantic

12:00 Lunch

1:30- 3:30 Case Studies in the Use of Molecular Methods in the Mid-Atlantic:
West Virginia - Pathogen Tracking Methods for Potential Use in TMDLs and Wellhead Protection in Berkeley County, West Va. - Ken Hyer, USGS Richmond District Offices

Virginia	- Charles Hagedorn, VPI
Delaware	- Sam Myoda, Delaware DNREC
D.C.	- Alfa Diallo, D.C. Public Health Laboratory
Pennsylvania	- Roger Carlson, Pa. DEP
Maryland	- Lee Currie, MD. Dept. Environment, Elichia Venso and Mark Franna, Salisbury State University

3:30 - 4:30 Panel Discussion on Pros/Cons of Different Methods and Needs for Validation and Integration into Water Monitoring Programs